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ATTAINMENT OF THE OVERWINTERING INSTAR AND THE CASEBEARING HABIT BY LARCH CASEBEARER LARVAE AT DIFFERENT ELEVATIONS IN THE BLUE MOUNTAINS

by

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ABSTRACT

The percentage of casebearing larvae on plots between 3,280- and 5,545-ft (1,000- and 1,690-m) elevation increased between September 11 and October 25 from 2.6 percent to 93 percent. Larvae at all elevations had reached the third (overwintering) instar by October 10. This information is useful in timing parasite releases or insecticide applications. Larvae at 4,000 ft (1,219 m) advanced more rapidly than larvae at higher or lower elevations.

what about real early spring?

Keywords: Larch casebearer, *Coleophora laricella*, insects, insect damage control (forest).

cc: OI, TM (JIDC)

The larch casebearer, *Coleophora laricella* (Hbn.) (Lepidoptera: Coleophoridae), is spreading through the range of western larch, *Larix occidentalis* Nutt., and is causing increasingly severe defoliation, a pattern reminiscent of its history in eastern North America before it was brought under biological control. Attempts to achieve control of this insect in the West include recolonization of parasites from the East and new importations from Europe.[1/][2/] As a temporary measure, local suppression can be achieved by applications of insecticides against larvae during the spring feeding period.[3/]

For best results in any control effort, it is necessary to know the habits of the insect and its local phenology. In colonization of parasites, it is necessary to time releases in the best synchronization with susceptible host stages. Parasites of the casebearing stage, for example, such as *Chrysocharis laricinellae* (Ratz.), if released during the summer when nonsusceptible needle mining larvae were present, would have to await the shift from the mining to the casebearer habit before susceptible host larvae were available. Likewise, insecticide applications would probably be more effective after the assumption of the casebearing habit. Applications when larvae are mining needles would have to penetrate the needle cuticle to reach the larvae. Casebearing larvae, on the other hand, would be exposed to insecticide deposits on the surface of the needles as they changed feeding positions.

This study was undertaken to establish the time of occurrence of the shift from the mining to the casebearing habit by larch casebearer larvae as it occurs at different elevations in the Blue Mountains.

METHODS

Study areas were in the Blue Mountains of southeastern Washington, approximately 15 mi (25 km) south of Pomeroy. Plots consisted of larch of approximately 30 to 100 ft (10 to 30 m) in height mixed with varying proportions of *Abies grandis* (Dougl.) Lindl., *Pseudotsuga menziesii* (Mirb.) Franco, *Pinus contorta* Dougl., and *P. ponderosa* Laws. at elevations of 3,280 to 5,545 ft (1,000 to 1,690 m).

1/ Robert E. Denton. Establishment of *Agathis pumila* (Ratz.) for control of larch casebearer, and notes on native parasitism and predation in Idaho. USDA Forest Service Research Note INT-164, 6 p. Intermountain Forest and Range Experiment Station, Ogden, Utah, 1972.

2/ R. B. Ryan and R. E. Denton. Initial releases of *Chrysocharis laricinellae* and *Dicladocerus westwoodii* for biological control of the larch casebearer in the western United States. USDA Forest Service Research Note PNW-200, 4 p. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon, 1973.

3/ Robert E. Denton and Scott Tunnock. Low-volume application of malathion by helicopter for controlling larch casebearer. Journal of Economic Entomology 61: 582-583, 1968.

Plots were located as follows:

	Elevation		Location
	ft	m	
Pataha Creek	3,280	(1,000)	T. 10 N., R. 42 E., sec. 15
Charley Creek	4,000	(1,219)	T. 9 N., R. 42 E., sec. 24
Road N94 at Martin Ridge	4,550	(1,387)	T. 9 N., R. 42 E., sec. 14
Road N94 at Big Spring Campground	5,000	(1,524)	T. 9 N., R. 42 E., sec. 27
Road N94 at snowmobile trail	5,545	(1,690)	T. 8 N., R. 42 E., sec. 4

Samples were taken at approximately 2-week intervals from September 11 to October 25, 1973. One branch approximately 12 in. (30 cm) long was taken from the lower crown of each of two trees per plot. The branches were cut into short sections and placed in a plastic bag, which was then closed with a rubber band and identified by plot and date. Samples were either examined the same day or placed in a portable ice chest for transportation back to the laboratory and examined the next day. In the examination process, short sections of twig were removed from the sample bag at random and all larvae found were classified as to whether they were needle miners or casebearers. The former category included a few larvae found outside of the needles but which were not in cases, as these larvae would have reentered needles as miners.[4/]

Head capsule widths of all larvae on September 11, and 20 per plot on subsequent dates, were measured to determine instar until all found on any one date had transformed to the third, or overwintering, instar. The percentages of larvae reaching the overwintering instar and the percentages of larvae which had assumed the casebearing habit were computed separately for each elevation and date. These measurements were made at 60X magnification using a calibrated eyepiece micrometer of a dissecting microscope.

RESULTS AND DISCUSSION

Results are presented in figures 1 and 2. On September 11, 52 of 103, or 50.5 percent, of the larvae from all elevations measured for head capsule width had molted to the third instar. On September 26, 91 percent had reached the third instar, and by October 10, all had done so. Therefore, larvae in the final sample on October 25 were not measured for instar determination.

On September 11, only 7 of 265, or 2.6 percent, of larvae from all elevations had formed a case. On subsequent sampling dates of September 26, October 10, and October 25, the percentages of casebearers for all elevations rose to 18, 67, and 93, respectively.

4/ Whether a larva is a needle miner or a casebearer has to do with its behavior. A larva is first a needle miner until it changes its habits and becomes a casebearer. This change occurs either late in the second instar (a morphological stage) or in the third instar. Thus, we have two measures of the developmental progress of a larva, one morphological and the other behavioral.

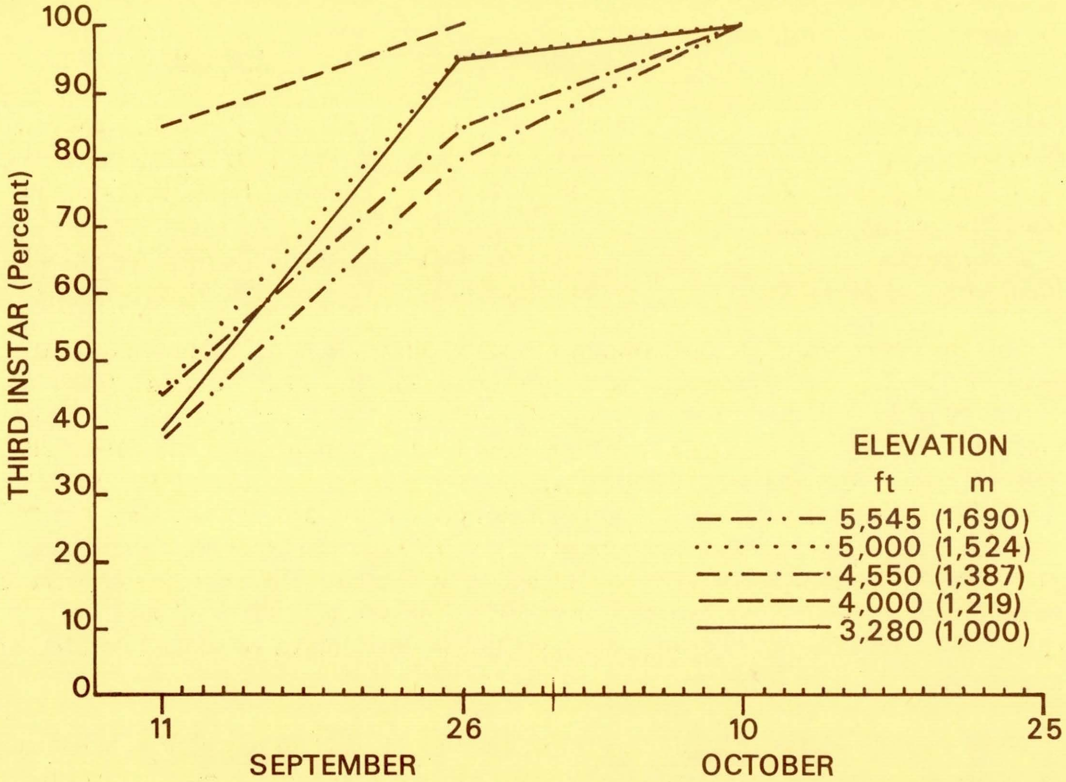

Figure 1.--Transformation to the third or overwintering instar by *Coleophora laricella* larvae at different elevations.

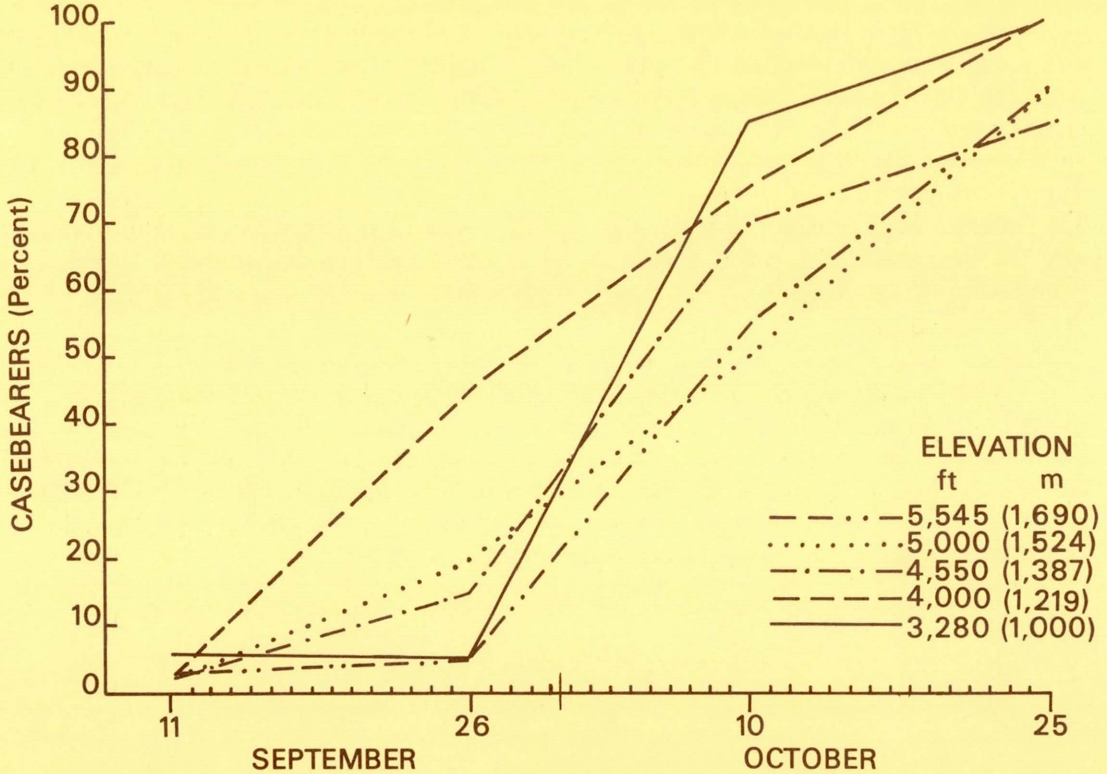

Figure 2.--Assumption of the casebearing habit by *Coleophora laricella* at different elevations.

As shown in figures 1 and 2, the population at the 4,000-ft (1,219-m) elevation was more advanced than populations at higher and lower elevations. This is evident from the higher percentage of third instars on September 11 and the higher percentage of casebearers on September 26. On September 26, larvae from 4,000-ft elevation were noticeably larger than larvae from 3,280 ft, even though essentially all were third instars. More rapid development at 4,000 ft than at higher elevations can possibly be attributed to temperature differences due to elevation. However, why the population at 4,000 ft should be more advanced than that at 3,280 ft is not completely clear, since both are creek-bottom plots with the same, essentially northerly, exposure.

Based on these 1973 data, parasite releases aimed at casebearing larvae should be delayed until mid-September, after which parasites would find some suitable hosts at all elevations. On the other hand, to find a fall date for insecticide treatment when all larvae were casebearers would be difficult. Some needle miners are present well into late October when the risk of inclement weather would make insecticide application, especially by aircraft, difficult.

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